

1 1. A procedure for activating a membrane-electrode
2 assembly (MEA) of an electrochemical cell operating at
3 substantially ambient conditions, said activation procedure
4 including the steps of:

5 a) exposing the MEA to temperatures higher than ambient
6 temperature, and substantially simultaneously back-
7 pressurizing gaseous reactants;

8 b) after the activation of the electrochemical cell,
9 returning conditions of said electrochemical cell to
10 ambient conditions; and

11 c) operating said electrochemical cell.

1 2. An electrochemical cell operating according to the
2 procedure of claim 1, comprising a proton-exchange membrane
3 fuel cell.

1 3. An electrochemical cell operating according to the
2 procedure of claim 1, comprising a direct methanol fuel cell.

1 4. The electrochemical cell operating according to claim
2 2, comprising at least one MEA composed of an ion-conducting
3 membrane, and at least one catalyst layer bonded thereto.

1 5. The electrochemical cell operating according to claim
2 2, comprising at least one MEA composed of an ion-conducting
3 membrane, and two, spaced-apart catalyst layers, each being
4 bonded on opposite sides of the membrane.

1 6. The electrochemical cell operating according to claim
2 3, comprising at least one MEA composed of an ion-conducting
3 membrane, and at least one catalyst layer bonded thereto.

1 7. The electrochemical cell operating according to claim
2 3, comprising at least one MEA composed of an ion-conducting
3 membrane, and two, spaced-apart catalyst layers, each being
4 bonded on opposite sides of the membrane.

1 8. An electrochemical cell operating according to the
2 procedure of claim 1, comprising membrane materials selected
3 from a group of materials consisting of: nonfluorinated
4 ionomers partially fluorinated ionomers, perfluorinated
5 ionomers, sulphonated polyetheretherketone, sulphonated
6 polysulfone, sulphonated polyphosphazene, polystyrene
7 sulphonic acid, and acid-doped polybenzimidazole.

1 9. The electrochemical cell operating according to the
2 procedure of claim 1, comprising a membrane containing organic
3 or inorganic dopants.

1 10. The electrochemical cell operating according to the
2 procedure of claim 1, comprising a membrane containing organic
3 or inorganic fillers.

1 11. The electrochemical cell operating according to the
2 procedure of claim 1, comprising membranes composed of mixed
3 ionomers forming composite membranes.

1 12. The electrochemical cell operating according to the
2 procedure of claim 1, comprising a laminated membrane.

1 13. The electrochemical cell operating according to the
2 procedure of claim 1, comprising a membrane with a supporting
3 template, whose pores are filled with at least one ionomer.

1 14. The activation procedure according to claim 1, where
2 catalysts, either unsupported or supported, are used to
3 fabricate said MEA.

1 15. The activation procedure according to claim 1,
2 wherein the electrochemical cell operates at a temperature
3 during activation that is higher than the temperature at which
4 the electrochemical cell is intended to operate, but not too
5 high that it can cause decomposition of the electrochemical
6 cell materials or dehydration of the MEA.

1 16. The activation procedure according to claim 1, where
2 gaseous reactants are pressurized.

1 17. The activation procedure according to claim 16,
2 where gaseous reactants are pressurized to less than 5
3 atmospheres.

1 18. The activation procedure according to claim 16,
2 wherein a pressure difference between a cathode gaseous
3 reactant and an anode gaseous reactant is less than 5
4 atmospheres.

1 19. The activation procedure according to claim 1, where
2 the activation procedure lasts more than approximately 5
3 minutes.

1 20. The activation procedure according to claim 1, where
2 the activation procedure further comprises the step of:

3 d) monitoring said electrochemical cell during the
4 activation.

1 21. The activation procedure according to claim 1, where
2 the humidification conditions of gaseous reactants are
3 controlled.

1 22. The activation procedure according to claim 1, where
2 the electrochemical cell is operated between a changing load
3 and a constant load.

1 23. The activation procedure according to claim 1, where
2 the electrodes contain various amounts of catalysts, ionomers,
3 and/or water repelling agents.

1 24. The activation procedure according to claim 1, where
2 the MEA includes catalyst-coated membrane (CCM).

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